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ABSTRACTS OF TUBERCULOSIS

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Present Ideas of Pulmonary Tuberculosis.—*Bacteriology:* The most widely held doctrine is that the tubercle bacillus is not an ordinary bacterium, but has a place in microbiological classification approaching such vegetable parasites as actinomyces. It does not behave as do the microbes of suppuration and septicemia, its action being more of a local one like that of the moulds. It sets up cellular reactions which tend to encyst it, but these also tend to necrose and break down their surrounding cells. It secretes no soluble toxin, as *B. diphtheriae*, nor even an endotoxin, as does the typhoid bacillus. Tuberculin is a special substance with little or no effect on the healthy body, acting in infinitesimal doses and in a manner suggesting a relationship with anaphylatoxic protein substances on the tuberculous body. Chemical studies show the richness of the bacillus in fatty substances (glycerides of oleic acid), waxes and waxy resins. The number of bacilli is apparently the most important factor in determining the severity of tuberculous infections. The bovine bacillus, at least so far as shown by French studies, seems to be a very rare cause of human infection. *Etiology:* Although the theory of direct heredity was undermined by the work of Villemin and Kuss, certain authors remain convinced that there exists an hereditary predisposition. Débré, in his report on the prophylaxis of tuberculosis at preschool age at the International Conference at Brussels, 1922, does not agree with Comby that "children of the tuberculous are as fine and strong as those of the nontuberculous" and that such an infant separated from its tuberculous parents, will behave like the child of normal parents. The contagiousness of tuberculosis appears rather to be conditioned by sensitiveness due to previous infection, resistance conferred by slight antecedent infection, and probably by certain consitutional factors. Bernard and Débré observed 128 children born of mothers having pulmonary tuberculosis, all of whom lived with her, most of them cared for by her, and some of them nursed by her, and found that 95 of them became tuberculous. Débré and Laplane concluded that a contact as brief as a few days in the newly born was sufficient to cause tuberculosis, but less dangerous than more prolonged contact. Débré and his coworkers believe that the infant, as well as the older child and adult, may under conditions of slight infection show merely a latent tuberculosis. The older the child, the more frequent the opportunities for infection, but these are apt to be less massive and more likely to be abortive and to become latent. This leads to the question of adult susceptibility to infection. Grancher, among others, held that adult tuberculosis is most often the awakening of a dormant childhood infection. Statistics on conjugal tuberculosis are of interest, owing to the intimacy of contact, but they vary greatly. It would appear that the contagiousness of tuberculosis for adults is much less than for children, and that prolonged and repeated contact with considerable doses is necessary to exert demonstrable effect. The average adult of urban population has acquired relative resistance to new infection from without, because of early infection, and manifests an allergic state. *Koch's phenomenon:* If one injects tubercle bacilli subcutaneously into a guinea pig, there is produced a "chancre of inoculation" at the end of ten or twelve days; the regional lymph nodes become involved, and a generalized infection results. If one reinjects, at another point, the same dose there is produced at the end of forty-eight hours a cutaneous eschar which does not result in the formation of a primary lesion but undergoes healing, and the regional nodes escape. Koch's phenomenon is of great significance. It can also be observed in the lung, the peritoneum, and other organs. It is merely one of the aspects of

tuberculous superinfection, when the dosage is not too massive; when the latter is small there is no local or general reaction. Even a minute dormant tuberculous lesion may induce the development of tuberculin hypersensitiveness and increased resistance to ordinarily lethal doses. After every tuberculous infection the body passes through a latent period of several weeks during which it fails to react to tuberculin, an antiallergic phase (Débré). *Distinction between resistance to superinfection and bacterial immunity:* The former type of resistance, as exemplified in tuberculosis and syphilis, exists only in the presence of a focus containing bacilli in an active state, while the better known bacterial immunity, as to typhoid fever, persists long after the bacilli and their lesions have disappeared. In the case of tuberculosis there is no humoral immunity, since the first tuberculous infection (at least, in the guinea pig) continues to progress uninterruptedly until death occurs. Although precise details are lacking, the severity of the infection and rapidity of its spread would seem, in both man and experimental animals, to depend largely on the initial dose. *Causes of reactivation of latent tuberculosis:* It is known that the allergic state disappears temporarily during the course of certain infections, as measles and influenza, also during pregnancy. The gravity of tuberculosis occurring at puberty, at the beginning of pregnancy, and at the time of labor, is well known. Many cases seem to arise following bronchopulmonary infections, such as whooping cough and pneumonia. The rôle of the endocrine glands is deemed important by some. *Clinicopathological problems:* Several years ago Grancher's conceptions were generally accepted; that is, that there is an initial period of germination followed by one of conglomeration. During the stage of germination the diagnosis had to be based on a minute study of the qualities of the vesicular murmur. This conception is now recognized as very hypothetical. The actual process appears to be about as follows: Initial implantation of the bacilli occurs, not most often at the apex, but in the upper part of the lower lobe or near the fissures, and constitutes the primary lesion. There is usually no associated clinical history and it is discovered either at autopsy or by radiography. From here the bacilli proceed by the lymphatic route to the hilum lymph nodes. In very young children, with a heavy infection, generalization may at once occur; when the infection is less the lymphatic reaction dominates the picture. From this reservoir the bacilli may reach the lung anew, either by direct extension, rupture into a bronchus, or into a pulmonary vein. These secondary lesions are the ones accompanied by clinical signs and symptoms. What are these signs and symptoms? Rist and Ameuille, in their recent works, tend to consider all active tuberculosis as essentially pneumonic. Rist throws overboard the modified respiration of Grancher, and considers that from the very beginning of the attack there are râles and bacillary expectoration. From the purely clinical viewpoint, however, it seems to Bezançon, that adult pulmonary tuberculosis rarely presents such a definite onset. As a child, the patient may have shown signs of tracheobronchial adenopathy, or repeated attacks of bronchitis; as an adolescent, pleurisy; as a young man, one or more hemoptyses. Throughout this period no râles were to be heard, nor was there bacillary sputum, but often there were respiratory modifications. True, these may be found without any pulmonary lesion, but it is dangerous to consider them valueless. Very often, the apparently abrupt onset of well-marked disease is preceded by a long premonitory period. The different types of tuberculous alveolitis are well described by Renon and Gérandel. Pure tuberculous bronchitis does not exist alone, being always secondary to an adjacent parenchymatous infiltration, with the exception of those rare forms described by Dumarest and Marolli, as chronic bronchitis with pulmonary sclerosis and emphysema occurring in the tuberculous, in which tubercle bacilli are absent, and acute inhalation tuberculosis which shows a positive sputum. *Diagnostic and therapeutic problems:* Radiodiagnosis has become truly a clinical method which should be added to physical diagnosis; however, the significance of various radiological shadows is still undetermined. The interest attached to the finding of tubercle bacilli in the sputum also attends the finding of bacilli in the feces, and new methods of collection and incubation of sputum. Petroff's method of culturing bacilli from the sputum is of interest, as is the complement-fixation reaction, although these are more of scientific than practical interest. The subject of the prophylaxis of tuberculosis has recently received much attention, both in its clinical and sociological aspects.—*La conception actuelle de la tuberculose pulmonaire, Bezançon, Rev. Belge d. l. Tuberc., February, 1923, no. 2, 57.*—(*A. P.*)

French Review of German Conceptions and Classification of Tuberculosis.—The recent statement made by de Meyenberg that Bard's classification, widely used in France and elsewhere, has no anatomic basis, suggests the need for a comprehensive

review of the current conceptions of the disease, particularly those emphasized in recent German literature and a careful comparison with those views held in France. The polymorphism of pulmonary tuberculosis must be recognized as an obstacle to any classification. Ranke has attempted to correlate pathologic anatomy with humoral reactions and distinguishes three stages in the general evolution of a tuberculous process: (1) phase of primary infection, characterized by the formation of a primary focus, "chancre of inoculation," and by the appearance of a heightened sensitiveness to tuberculous infection; (2) phase of hypersensitiveness and generalization; (3) phase of relative immunity and localization of lesions. *Primary infection:* This has been studied especially by Kuss, Ghon, Albrecht and others. Recently Puhl, a pupil of Aschoff, has described certain new and interesting features of the "chancre of inoculation." This initial lesion resulting from first infection consists of a pulmonary and a lymphatic focus. It has a predilection for those parts which breathe deeply, especially the subpleural layers. In two cases out of 131 Puhl found the primary focus in the intestinal tract. This primary focus may vary in size from a pinhead to a nut. Histologically, it shows a central caseous spot, in the midst of a pneumonic area, and a peripheral zone of granulation tissue and numerous specific elements. The peripheral zone of inflammation (Ranke) is rich in cells, and almost always presents miliary tubercles with characteristic giant cells. The lymphatic lesion involves the chain tributory to that part of the parenchyma occupied by the primary focus. A simple hyperplasia is the characteristic change, caseation occurring only in the lesion of reinfection. About the pulmonary and lymphatic foci there occurs a nonspecific congestive reaction. The primary focus may undergo encapsulation, or transformation. There is a specific and a nonspecific capsule. The former consists of a hyaline layer or layers developing among the cells of the epithelioid zones, which finally disappear, leaving a compact homogenous layer and elastic fibres. The nonspecific capsule is essentially made up of fine fibrils, easily stained by von Giemsen's stain, with numerous round cells and some elastic fibres, and with intimate vascular connections. The surrounding pulmonary tissue is very little altered. Other characteristics of the primary lesion are rapid and abundant tendency to calcification. On the other hand, the lesions of reinfection are ordinarily multiple, and in the upper lobe; the surrounding pulmonary tissue is profoundly changed, atelectatic, edematous, pigmented, and invaded by fibrous tissue in many cases, while the elastic tissue is greatly hypertrophied. Calcification is either absent or occurs very slowly, and the lymphatic element is commonly lacking. Between these types of lesions, however, there may exist transitions. The phase of primary infection is preceded by a latent period which, in man, may be of two or three months' duration. During the phase of primary infection, specific sensitiveness is developing and slowly increasing, to attain its maximum in the secondary period. It seems logical to infer that it is parenteral ingestion and transformation of tuberculous material that brings about these changes in reaction. They manifest themselves by the phenomena of perifocal congestion and biologically by the cutaneous tuberculin reaction. *Phase of hypersensitiveness and generalization:* This state must not be confused with generalized miliary tuberculosis, although that may be a possible manifestation. However, it is by way of the blood-stream most often that new foci become implanted in various organs—lymph nodes, bones, joints, skin, eye, etc. They are always accompanied by a specific congestive reaction which is most pronounced in the case of the pulmonary parenchyma. Ribadeau-Dumas, who has made a careful study of tuberculosis in childhood has drawn attention to pneumonic attacks, congestive tuberculosis, which in spite of the intensity of the physical signs do not carry an unfavorable prognosis. Diffuse pulmonary changes may clear up almost entirely, leaving perhaps merely a small calcified tubercle. The corresponding humoral state is one of hypersensitiveness, but this hypersensitiveness is more of the tissues than of the entire body, as the constitutional condition may be good. Ranke finds that tuberculin tests during this period show a similar condition, that is, intense local and focal reaction, but little fever or constitutional disturbance. *Phase of relative immunity and localization of lesions:* This is the best known period of pulmonary tuberculosis. The lesions are more or less localized in the lung parenchyma, inflammatory changes are less important, but there is a tendency to necrosis and caseation. There is not, as in the preceding stage, a tendency to rapid or complete *restitutio ad integrum*. The evolution is slow, a cure is obtained only with great patience and, anatomically speaking, is exceptional. Metastasis by the blood-stream practically ceases. Adenopathy also is lacking. Even in severe cases there is little tendency for the bacilli to form new foci in other organs. However, there is a marked general hypersensitiveness, with such constitutional disturbances

as fever, sweats, asthenia, etc. Likewise, tuberculin injections cause severe general reactions in small doses, but very little local reaction. Calmette compares the evolution of chronic phthisis to a succession of Koch phenomena. *Mode of extension of the lesions:* According to Ranke, each stage of the disease corresponds to a particular mode of propagation, as follows: (1) *primary infection:* propagation by the lymphatic route and by contact; (2) *generalization:* propagation by all routes, blood, lymphatic, canalicular, and by contact; (3) *chronic phase:* propagation only by the bronchial tract and by contact. French authors will undoubtedly accept these propositions for the first two stages, but will dispute the exclusive rôle of the bronchial tract in chronic phthisis. Sabourin emphasizes the rôle of bronchial emboli in the production of caseous pneumonia. Those who have studied especially therapeutic pneumothorax (Renon, Dumarest, Burnand) have a tendency to regard lymphatic extension as preponderant. It is curious that propagation if it be by the bronchial route, does not seem to be greatly checked by the establishment of a therapeutic pneumothorax. Lindblom, in a recent study, finds it not uncommon for fresh foci to develop in the sound lung after its establishment. On the other hand, lung collapse would not constitute such a hindrance to lymphatic or bronchial extension as it would to hematogenous dissemination. *Pathogenesis of adult tuberculosis:* Ranke and his pupils believe that adult tuberculosis should be considered as the reawakening of metastatic foci of the secondary period. Hart, on the other hand, believes that there must have been a fresh hematogenous dissemination from the primary lesion and cites two cases come to necropsy which showed as a possible source of infection only an old lymphatic focus at the hilum of the lung. For Aschoff and his pupils, it is necessary to assume a reinfection or superinfection air-borne, of exogenous origin. In the case of organs without external communication, however, he adopts Ranke's opinion of the reawakening of a metastatic focus of the secondary period. However, chronic pulmonary tuberculosis in the adult should be considered as resulting in most cases from an exogenous aerogenic superinfection. *Clinico-pathological classification* (Aschoff, Nicol): Here the pulmonary lobule is regarded as the unit. It is composed of a group of acini with their alveolar ducts and infundibula. Aschoff divides tuberculous pulmonary lesions into two main groups: (1) productive tuberculosis, characterized by abundant granulation tissue, rich in cells and formed elements; and (2) exudative tuberculosis, characterized by the appearance in the alveoli of a fibrino-leucocytic exudate comparable to that of pneumonia, but with a marked tendency to caseous necrosis, both of these elements and of the alveolar tissue. Chronic tuberculosis is resolved into two fundamental pathological types, the acinonodular and the caseous bronchopneumonic. The territorial unit of the first type is the acinus; of the second, the pulmonary lobule. Histologically, the productive tissue in the first type develops from the interior of the acinus, and macroscopic section shows little grayish masses of the pattern of a frog's foot or clover leaf. A collection of such formations resembles a bunch of grapes. The evolution of such lesions is ordinarily toward fibrosis which seems to develop within. The other, bronchopneumonic or exudative, type is of much more rapid evolution with early tissue destruction and development of foci en masse. One cannot always sharply separate the two types. These types have also been subdivided by Nicol as follows:

I. Bronchogenic forms (chronic pulmonary tuberculosis)
   1. Productive Types:
      a. Acinonodular
      b. Nodocirrhotic
      c. Cirrhonodular
      d. Cirrhotic
   2. Exudative types:
      a. Lobular caseous bronchopneumonic
      b. Lobar caseous bronchopneumonia

II. Generalized hematogenous forms (miliary tuberculosis)
   1. Interstitial types:
      a. Pure productive
      b. Productive and exudative
   2. Intraäcinous types:
      a. Productive acinous
      b. Exudative

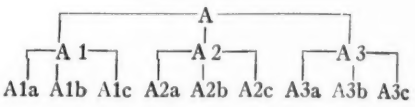
The mixed productive and exudative type corresponds to Orth's interstitial pneumonia. Nicol is particularly insistent that the basis of classification should be anatomic corresponding as closely as possible to the pathological anatomy. For purposes of prognosis he adds to Aschoff's tables a consideration of the presence or absence of cavities, and the extent of the lesions. He discards the usual division according to lobes of the lung, as deceptive and misleading, and instead divides the lung into three fields: *superior*—limited by a horizontal plane passing from the level of the sternal insertion of the second rib anteriorly to the midscapular region posteriorly; *middle*—limited by a plane passing from the sternal insertion of the fourth

rib anteriorly to the lower border of the scapula posteriorly when the arm is adducted; and *inferior*—everything subjacent to such a line. Nicol also brings into his classification the results of sputum examination, bacilliferous or nonbacilliferous, and the rather vague term, "general reaction of the patient." One other classification, that of Ulrici, should be referred to. It more closely approximates the French conceptions, those of Bard. He distinguishes three principal forms: *1:* Acinonodular, which is a chronic form of slow evolution, tending either to caseation or fibrosis, but especially the latter. The stethoscopic signs decrease progressively from above down, and correspond to the radiographic picture. Tubercle bacilli in the sputum are usually abundant. *2:* Cirrhotic type of very slow evolution and extreme chronicity. There is apt to be little sputum and few râles, but rather changes in breath-sounds. There are apt to be periods of activity separated by long quiescent intervals. The diagnosis is often missed. Cavities are exceptional, but there are often bronchial dilatations. Secondary degenerations of heart, kidneys, or liver are not rare. This type is especially well diagnosed by the X-ray. *3:* Pneumonic, in which evolution is more or less rapid and acute. There is marked toxemia, but in spite of it the general condition may remain good until shortly before death. Râles are numerous and clear-cut. The sputum is abundant and richly bacilliferous. *Radiological studies:* The classification of Aschoff-Nicol receives its most substantial support from the recent work of Gräff and Kupferle. They believe that they can recognize radiographically the anatomic forms described by Aschoff, as follows*: acinonodular form*—small, irregular spots, often of clover-leaf design, with well defined borders; *bronchopneumonic form*—larger spots, less well defined, tending to confluence, darker clouding than the preceding; *cirrhotic form*—usually extended irregular shadows, with characteristic peripheral radiations and points of condensation in the centre. For Gräff and Kupferle, the hilar origin of pulmonary tuberculosis is an erroneous notion. They find that both on the plate and screen lesions situated in different parts of the lung parenchyma are projected in the same plane and that apparent perihilar tuberculosis is due to such an illusion. However, Rist and Maingot have presented a series of pictures which seem to prove that in certain cases of unilateral tuberculosis lesions may extend to the healthy lung with an initial perihilar distribution. For Leon Bernard, all tuberculosis of reinfection would have a hilar origin, tuberculosis of the apices being only a reawakening of lesions of first infection. One may well be perplexed in the face of such contradictory opinions. Gräff and Kupferle also distinguish two types of cavity, one situated posterosuperiorly near the pleura, of slow evolution; the other in the anterior plane, with more rapid evolution. In acute generalized tuberculosis, according to Gräff and Kupferle, radiography is essential for the diagnosis, and again productive and exudative processes can be distinguished, the former evolving less rapidly and having a less grave prognosis. *Comparison of German and French conceptions:* It is incorrect to say, as de Meyenburg does, that Bard's classification has no pathological-anatomic basis. Bard considers two main groups, *acute* and *chronic*. The chronic group includes these types*: caseous, fibrocaseous* and *fibrous*, which correspond naturally to the three essential forms of Aschoff's scheme, *bronchopneumonic, acinonodular* and *cirrhotic*. When we come to the acute forms there is more divergence, but one can find in a review of French literature most of the facts mentioned by the German authors. The mixed productive-exudative form has been described by Letulle, who has shown that the tuberculous granulation grows not only by an increase in the lymphocytic zone, but by attacks of perigranular alveolitis. Bezançon and Letulle have also described the intra-acinous exudative form, and have shown that the miliary tubercle is not always on aggregate of primordial follicles, but often arises from a pneumonic tuberculosis, as is well shown microscopically. The chief difference between the French and German concepts may be briefly mentioned. For the Germans, the acinonodular focus belongs histologically to follicular productive tuberculosis. For the French, this acinonodular lesion is most characteristic of chronic fibrocaseous pulmonary tuberculosis. The Germans would place a certain proportion of fibrocaseous tuberculosis under the group of pneumonic tuberculosis. They admit, of course, that pneumonic tuberculosis may undergo fibroid changes. For them chronic pulmonary tuberculosis results most often from follicular lesions, while in France Tripier has apparently demonstrated that the underlying nature of most tuberculous lesions is essentially pneumonic, these lesions later resolving themselves into the varying pathological types of tuberculosis—*ulcerating, caseous, fibrocaseous* and *fibrous*. One is surprised to find in the German literature little reference to the curable tuberculous pneumonic lesion described by Bezançon, Bernard, Lereboullet and others, and they appear to recognize a tendency to resolution of pneumonic lesions only in Ranke's second

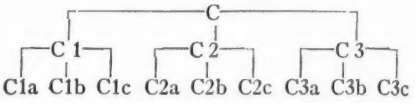
stage. There is also no reference to corticopleuritis, which seems to be a definite entity, although this has been doubted. In conclusion, the old classification of Bard is preferred for general use, although it is admitted that the newer classifications have their value and interest.—*Les conceptions allemandes actuelles sur l'evolution generale de la tuberculose et sur la classification des formes anatomo-cliniques de la tuberculose pulmonaire, A. Giraud and A. Sédal, Rev. d. l. Tuberc., 1924, v, 5.*—(*A. P.*)

System of Classification of Pulmonary Tuberculosis.—It is emphasized that the proportionate distribution of clinical types of phthisis differs profoundly in different areas throughout the British Isles. Three fundamental questions are to be answered: (1) Is the disease an "acute initial" or a "chronic recrudescent" stage? (2) What is the anatomic extent of the disease? (3) What is the balance between infection and resistance? For the classification according to anatomic extent there was the *International Classification*, for the estimation of the individual "balance" *Inman's classification*, based on temperature as an index to auto-inoculation. The following divisions are added: *A: Acute Initial Group:* A case is to be regarded as such when the progress of the illness has been continuous from the start, and never over a period of more than two years. *C. Chronic or Recrudescent Group:* This comprises cases where there have been previous signs of tuberculous infection, such as hemoptysis, pleurisy, bone, joint or lymph node disease, abdominal or pulmonary infections, etc., but separated from the present illness by periods of relatively good health; also all cases over two years' standing. *Anatomic Extent of the Lesions:* To express this the International Classification is employed, using the terms adopted by the American Sanatorium Association Committee, as follows: *1. Minimal* = disease of slight severity limited to small areas of one lobe. *2. Moderately Advanced* = disease of slight severity more extensive than *1* but affecting at most the volume of one lobe. *3. Far Advanced* = all cases beyond *2* or with considerable cavities. *Constitutional Balance:* Inman's classification is employed as follows: *a* = resting febrile, *b* = ambulant febrile, *c* = ambulant afebrile. The need to supplement anatomic extent by an evaluation of the degree of toxemic disturbance is well recognized, and Inman's system seems most satisfactory and scientific. The final classification scheme is given in diagram:

Acute initial group



Chronic and recrudescent group



The pyrexial divisions of the *A* group represent a formidable and fatal type of "galloping consumption," much more common in the British Isles twenty years ago than today, commoner among females than males, among adolescents and young adults than middle aged and elderly persons, and in rural than metropolitan areas. By the use of inquiry cards valuable data have been obtained for institutions in Wales, as well as in or near London, the latter for comparison. They show that the proportion of "acute initial phthisis" is greater in Wales and occurs earlier in life. The results are in accordance with the findings of John Brownlee. These Epidemiological Enquiry Cards will be supplied to tuberculosis workers elsewhere on request.—*A System of Classification of Pulmonary Tuberculosis, S. L. Cummins, Brit. J. Tuberc., April, 1923, xviii, 43.*—(*A. P.*)

Open and Closed Tuberculosis.—According to suggested classifications, persons with "open" tuberculosis have tubercle bacilli in the sputum, those with "facultative-open" disease have bacilli present in the sputum occasionally, and these with "closed" tuberculosis have sputa which are bacilli-free. But it is not safe to depend upon microscopic examination of the sputum. If no bacilli are found in smears, animals must be inoculated. By this means a fair percentage of so called "closed" cases of tuberculosis are shown to have bacilli in their sputum. The classification of tuberculosis as "open" or "closed" upon one or two sputum examinations exerts a bad influence on hygienic measures and is in itself poor hygiene. Clinical signs and symptoms are much more certain guides as to activity in pulmonary tuberculosis and its infectiousness than the failure to find bacilli in sputum. This is not at all to say that sputum examination should not be made, but those who

advocate classifying as "closed" all cases which have negative sputum are a danger to community health.—*Zur Frage der "offenen" und "geschlossenen" Tuberkulose, W. S. Shemenski, Deutsche med. Wchnschr., February 8, 1924, l, 170.*—(*H. S. W.*)

Types of Human Tuberculosis.—Tuberculosis is divided into (1) the acute progressive form occurring in previously tuberculosis-free individuals, (2) the slowly progressive forms, tending to heal, and finally (3) the "immune immobile and local" tuberculosis in which the tubercle bacillus merely plays the rôle of a harmless invader. —*Über das Wesen der menschlichen Tuberkulose, R. Arima, Ztschr. f. Tuberk., May, 1923, xxxviii, 187.*—(*H. J. C.*)

Tuberculosis Observation Work among Pensioners.—Accurate diagnosis of tuberculosis is at all times a matter of great importance, but to the Ministry of Pensions such accuracy is especially essential, for dependent upon the diagnosis of this disability is the acceptance or rejection by the state of a liability extensive both in time and in amount. In the work of the ministry precision and accuracy in the diagnosis of tuberculosis was at first lacking. Thus, before the war had long been over, there were numbers of pensioners with, on the one hand, an entitlement for a tuberculosis which did not exist, and, on the other, a lack of entitlement for a tuberculosis that did. In 1920, 100 cases were taken at random of men pensioned for tuberculosis to be subjected to a comprehensive expert examination and it then appeared that about one-third of these were wrongly diagnosed as tuberculous. At present there are a number of beds in Ministry of Pensions hospitals, set aside for observing and diagnosing tuberculosis. A time limit of 28 days is set for the period of observation and the average stay of each case is about three weeks. In June, 1923, there were nearly 40,000 pensioners suffering from tuberculosis, including 3,300 nonpulmonary cases. The symptoms of a depreciated physical state, loss in weight, chronic cough, with sputum, reputed "coughing up of blood," the presence of slight physical signs were common enough in these men returned from the war, and thus it is easy to understand that diagnoses of tuberculosis were made in a great number of cases. Men who were gassed were wrongly considered more prone to tuberculosis. Men returning from the East, debilitated by malaria and dysentery, often showed transient chest symptoms on return to a colder climate and were viewed more gravely than after-experience proved to have been necessary. Patients under observation are subjected to clinical, pathological and X-ray examinations. Of the 500 cases comprising this study, 243 had pensions for pulmonary tuberculosis, and of these 37 had records of tubercle bacilli having been found at least once; the remaining 205 had been diagnosed on clinical grounds. Of 243 cases admitted with reputed and "entitled" tuberculosis 21 still showed tubercle bacilli, 6 showed activity, 121 showed evidence of old quiescent or arrested lesions, while in 95 there was no clear evidence of present or past tuberculosis. Traumatism may induce by inoculation a localized tubercle, aggravate existing or latent tubercle, or even cause a generalization of preëxisting tubercle. *Conclusions:* As to the value of the complement-fixation test, strong positive reaction suggests tuberculous activity. A persistent and strong positive reaction should cause the clinical signs and symptoms to be carefully scrutinized if tuberculosis is not clinically definite. The value of an X-ray report largely depends on the experience in chest films and screen work of the reader.—*An Account of the Tuberculosis Observation Work of the Ministry of Pensions, A. Sandison and G. B. Price, Lancet, June 14, 1924, ccvi, 1195.*—(*B. T. McM.*)

New Governmental Measures of Relief for Tuberculous Ex-Service Men.—The liberalizing features of the World War Veterans Act, 1924, more commonly known as the Reed-Johnson Act, approved by the President on the last day of the recent session of Congress, are bringing relief to thousands of veterans of the late war, according to a statement made by General Frank T. Hines, director of the U. S. Veterans Bureau. We are putting the new provisions into effect as rapidly as practicable," said Director Hines. "When the full effects of the Act are felt, I believe the veterans will receive a full measure of desired aid from the U. S. Government." The World War Veterans Act, 1924, is the result of a desire on the part of the officials of the U. S. Veterans Bureau, representatives of veteran organizations, and of the Congress itself, to remove the flaws that have appeared in the previous veteran relief Acts, to enlarge upon the relief functions of the Bureau, and to codify the laws affecting veterans of the late war. There is probably no feature of the Act more outstanding than that which provides hospitalization in Government hospitals and necessary traveling expenses in the case of any veteran of any war or expedition since 1897, who has not been dishonorably discharged from the service, and who is in need

of a hospitalization, without regard to the nature or origin of his disabilities. Preference, however, will be given to those veterans who are financially unable to pay for hospitalization and necessary traveling expenses. This provision is one that will appeal to every world war veteran as an example of the gratitude the nation feels towards its soldiers. Those veterans suffering from active tuberculosis will be especially interested in the feature of the Act which provides that when the disease appears before January 1, 1925, developing a 10 per cent degree of disability, it shall be conclusively presumed that it is of service connection. Such disabilities as neuropsychiatric disease, paralysis agitans, encephalitis lethargica, and amoebic dysentery, developing a 10 per cent degree of disability before January 1, 1925, have been given a rebuttable presumption of service connection. It is estimated that these provisions will provide compensation and hospitalization to many veterans who before the passage of the Act had been unable to connect their disabilities with service. The new Act gives to the Director the right to delegate to the subdistrict offices certain powers which were previously restricted to the central office and the regional offices with the object of making awards of vocational training and of compensation and ratings of disability as quickly and conveniently as possible and at the place where the examinations are made. For those entitled to vocational training, as important feature of the new Act is that providing that the test of rehabilitation is to be employability and that the trainee is entitled to maintenance and support allowance for two months after this condition has been reached. No course in vocational training will be commenced after June 30, 1925; nor incompleted training extended after June 30, 1926. Several new insurance features have been provided. Under the provision preventing lapsing of insurance, when the veteran is entitled to uncollected compensation and becomes permanently and totally disabled or dies, insurance may be paid in the amount that the uncollected compensation would purchase. All term insurance shall cease on July 2, 1926, except when death or total permanent disability shall have occurred before July 2, 1926. When term insurance has matured by reason of total and permanent disability, and such total and permanent disability has ceased, the insured, while required to renew payments on term insurance will have two years from the date he is required to renew payments of premiums, in which to convert the term insurance, even though this might extend beyond the period in which term insurance would otherwise have to be converted. The benefits of the new Act are limited to those who suffer from disability or injury that can be connected with service between the declaration of war, April 6, 1917, and the peace resolution of July 2, 1921. The former requirement that the disease or injury must have been incurred "in line of duty" has been stricken out; but the requirement that such disease or injury be not the result of wilful misconduct has been retained. Members of the National Guard, called into Federal service, who became disabled or who died before being accepted and enrolled for active service, are placed in the same status as men inducted by local draft boards. Payments to dependents of deceased veterans have been increased as follows:

If there is a widow but no child, from $25 to $30 a month.

If there is a widow and one child, from $35 to $40 a month, with $6 a month for each additional child. This is an increase of $1 a month per child, with no limitation on the number.

If there is no widow but three children, $40 a month with $5 a month for each additional child.

The payment of compensation to a parent on account of the death of a child is to continue until the death of the parent. A provision is included in the Act whereby any veteran having tuberculosis of a compensable degree, who has been hospitalized for a year, whose disease has, in the discretion of the Director of the Veterans Bureau, been completely arrested, and who is discharged from further hospitalization, will be rated temporarily and totally disabled and such rating shall not be decreased within a period of six months. Any veteran having tuberculosis of a compensable degree, who has been hospitalized for a year, whose disease in the judgment of the Director of the U. S. Veterans Bureau, cannot be arrested by further hospitalization; whose discharge from hospitalization will not hurt himself or family, and who in the judgment of the Director is not feasible for vocational training, shall upon his request be discharged from hospitalization and rated temporarily and totally disabled for a period of at least three years. The loss of the use of limbs is now to be considered equivalent to the loss of the limbs, for the purposes of rating the disability. There is a provision that the loss of the hearing of both ears is a condition of permanent total disability. Compensation for the loss of the use of both eyes is increased to $150 a month, and for the loss of the use of both eyes and one or more limbs, to $200 a month. Injuries or death resulting from

hospitalization or from vocational training, unless due to misconduct on the part of the veteran, are made compensable in the same manner as though occurring during service. A veteran so helpless as to need a nurse or attendant is allowed $50 a month for that purpose. After June 30, 1927, veterans not totally and permanently disabled and maintained by the Bureau in a hospital and without wife, child, or dependent parent, will not receive more than $40 a month while remaining in hospital. When a disabled person, having neither wife, child, or dependent parent, shall have been maintained after July 1, 1924, in a hospital for mental diseases and shall be deemed by the Director of the Veterans Bureau to be permanently insane, compensation for such person shall be $20 a month thereafter as long as he shall be in such hospital. During this period the compensation may be paid to the chief officer of the hospital for the benefit of the patient. If the patient shall recover and be discharged as cured, an additional $60 a month shall be paid him for the period his compensation was previously reduced. If a veteran is found who is retarding his recovery by gross dissipation, the Bureau may deposit up to three fourths of his compensation with the Treasurer of the United States to be given to the patient upon his discharge from the hospital. The Director is given power to suspend payments to guardians who fail to render accounts showing that they have made proper application of payments for the benefit of their wards. Unless it can be shown that the beneficiary practised fraud, no reduction or discontinuance of compensation will go into effect until three months after it is determined upon; nor shall such reduction be made retroactive.—*Bulletin released for publication by U. S. Veterans Bureau, June 30, 1924.*

Tuberculosis Ex-Patients in Industry. Of the 1,354 tuberculous patients discharged from Mount McGregor Sanatorium between 1914 and 1922, 727 or 72 per cent are at work, 209 or 15.4 per cent are dead, 32 or 2.3 per cent have been readmitted to the sanatorium. Eighty-five per cent of the incipient cases are at work, 58.9 per cent of the moderately advanced, and 19.5 per cent of the far advanced. Thirty-three per cent of the expatients are clerks, 40 per cent insurance agents, and the remainder are occupied in 12 different occupations. Health is better and more surely maintained when the expatient resumes the same kind of physical and mental exertions as those to which he has been accustomed. Eighty-eight per cent of patients have increased their earnings since taking their cure, 8 per cent are earning less, and 4 per cent are earning the same.—*The Care of the Tuberculous in Industry, H. J. Howk, Boston M. & S. J., July 17, 1923, cxci, 91.*—(*B. T. McM.*)

National Loss from Tuberculosis.—The United States has at present about a million cases of active tuberculosis of which the number of deaths is approximately 100,000 a year. Dr. J. W. Glover of the University of Michigan has calculated that at the age of 20 years the expectation of life is 46.16 years in a community where tuberculosis is not present, and in a community where tuberculosis exists the expectation of life is reduced by 2 years and 158 days. Various estimates of the wealth-producing ability of the male members of a community lead to the conclusion that the yearly economic loss from tuberculosis amounts in the United States to between $300,000,000 and $1,600,000,000. The other, nonmaterial losses, are, of course, not subject to computation. The diminishing death-rate from tuberculosis is due to improvements in diagnosis and treatment and the great development of prophylactic measures. Irrespective of whether tuberculous symptoms are suspected or not, a yearly medical examination is advisable.—*The National Loss from Tuberculosis, J. G. Townsend, Military Surgeon, 1924, liv, 440.*—(*E. C.*)

Davos Research Institute.—The institute consists of various sections. It contains 20 laboratories and rooms, is well fitted for the conduct of investigations relating to respiratory gas analyses, blood tests, physical spectrum measurements, microphotography, X-ray work, experiments on animals, etc. It is conducted by a board of directors composed of nine members, of whom five must be physicians or doctors of one of the exact sciences. It is hoped that it may be possible to arrange for free residence for research workers from some of the "weaker" countries.—*The Davos Research Institute for Alpine Physiology and the Study of Tuberculosis, Brit. J. Tuberc., January, 1924, xviii, 11.*—(*B. T. McM.*)

Tuberculosis Death-Rate among Industrial Populations of American Cities and Canadian Provinces.—Tuberculosis is still so important a cause of death that it determines to a considerable degree the total death-rate of the community. We find that, for the most part, the same states and provinces which have been pointed out as having the most favorable death-rate for

Death-rates per 100,000 persons exposed. Tuberculosis—all forms. By geographic division, state and province. Metropolitan Life Insurance Company, Industrial Department, 1923

(Excluding infants under one year of age)

GEOGRAPHIC DIVISION	RATES PER 100,000	
	White	Colored
Total Company	92.4	244.4
UNITED STATES	90.5	244.2
New England	83.3	214.8
Maine	85.1	*
New Hampshire	87.3	*
Vermont	61.3	*
Massachusetts	81.4	201.5
Rhode Island	93.1	*
Connecticut	84.9	245.7
Middle Atlantic	92.8	233.9
New York	95.5	252.5
New Jersey	92.8	230.8
Pennsylvania	87.6	220.8
East North Central	76.6	212.5
Ohio	76.7	257.7
Indiana	94.8	184.0
Illinois	69.1	197.4
Michigan	83.2	262.7
Wisconsin	73.3	332.0
West North Central	66.8	218.6
Minnesota	84.0	344.7
Iowa	53.9	159.6
Missouri	70.0	234.6
Nebraska	41.3	249.4
Kansas	48.4	170.2
South Atlantic	108.8	292.7
Delaware	75.2	173.7
Maryland	121.0	361.1
District of Columbia	88.1	249.3
Virginia	96.6	261.0
West Virginia	100.0	251.7
North Carolina	111.0	335.7
South Carolina	113.4	417.5
Georgia	121.9	296.6
Florida	107.3	280.1
East South Central	128.8	275.8
Kentucky	134.3	233.0
Tennessee	139.4	289.1
Alabama	98.8	290.3
West South Central	128.4	259.6
Arkansas	81.3	340.6
Louisiana	132.8	209.8
Oklahoma	80.8	240.7
Mountain	148.1	*
Montana	46.4	*
Idaho	17.8	*
Colorado	369.2	*
Utah	16.3	*
Pacific	104.3	211.7
Washington	74.6	211.8
Oregon	43.3	284.4
California	119.0	208.5
CANADA	111.5	*
Eastern Provinces	120.3	*
Nova Scotia	158.0	*
New Brunswick	113.9	*
Quebec	161.0	*
Ontario	61.8	*
Western Provinces	41.7	*
Manitoba	36.0	*
Saskatchewan	29.7	*
Alberta	58.1	*
British Columbia	42.6	*

*Death-rate not calculated on account of small number of colored policyholders.

all causes combined, among Metropolitan Industrial Policy-holders, are also those which have relatively low mortality from tuberculosis. The Western Provinces of Canada have, far and away, the lowest death-rates among their industrial populations, both for tuberculosis and for all causes. The West North Central States, 'including Nebraska, Kansas, and Iowa, which have the next best record for tuberculosis, rank third in general mortality. The East South Central, West South Central and South Atlantic States, together with the Eastern Provinces of Canada, have high general death-rates and also high tuberculosis mortality. In seven of the eleven geographic divisions in the subjoined table, that state which has the highest tuberculosis death-rate also registers the maximum mortality for all causes combined. On the other hand a very high mortality from tuberculosis may be associated with the very best health conditions as is the case with Colorado, where many thousands of those afflicted with tuberculosis go each year in the hope of saving or prolonging life. The regional distribution of tuberculosis presents an interesting picture. The industrial populations of the cities show higher tuberculosis rates for the most part below the Mason and Dixon Line. In the South Atlantic group Delaware is the only one of eight states whose industrial population death-rate is below that for the whole country. The rate for each of the East South Central States, particularly Kentucky and Tennessee, is far in excess of the average. Among the Northern States, on the other hand, every New England State, except Rhode Island, exhibits a below-average rate; so does every East North Central State except Indiana, every

Mountain State except Colorado, every Pacific Coast State except California, and every West North Central State, without exception. The most fertile field for the antituberculosis movement in this country now lies among the urban wageworkers of the South Atlantic and East South Central States and of Louisiana. The lowest rates recorded were those for Utah (16.3 per 100,000) and Idaho (17.8). The Nebraska figure was only 41.3, that for Oregon, 43.3 and that for Kansas, 48.4. The foregoing paragraphs relate to white persons. Among the two million colored policyholders of the Metropolitan we find, likewise, considerable variation; but everywhere the rates are much higher than among the whites. Tuberculosis is still prëeminently the disease of the colored people. In New England, the East North Central and West North Central regions, the colored policyholders show favorable conditions. It is in the South Atlantic States that the rates are highest, and in South Carolina the figure mounts to 417.5 per 100,000. Kentucky and Louisiana, which had two of the highest death-rates among the whites, show relatively favorable records for the colored. The table presents the death-rates for white and colored policyholders respectively by geographic division, state and province.—*Tuberculosis Death-rate among Industrial Populations of American Cities and Canadian Provinces, Statistical Bulletin, Metropolitan Life Insurance Co., April, 1924, v, no, 4, p. 1.*

Factors Responsible for Decline of Tuberculosis Mortality.—Cardiac disease and pneumonia have already passed tuberculosis in the mortality list and cancer is a close rival. In 1910 the mortality in Massachusetts was 179.8 per 100,000, while in 1923 it was 89.8, or a reduction of 50 per cent which means a saving of 2,467 lives annually. The factors responsible for this are general health education, the realization of the importance of personal and industrial hygiene, earlier and more accurate diagnosis, preventive medicine, increased attention to the health of children, better living and working conditions, higher wages and shorter hours of work, prohibition, more efficient and intelligent official health administration, and all the direct means to limit the spread of tuberculosis. In Massachusetts there are sufficient beds in the state and county sanatoria for all cases needing treatment. There are clinics by experts, volunteer work, preventoria and school medical inspection. The Boston association places arrested cases of tuberculosis in suitable employment.—*President's Address at the Annual Meeting of the Massachusetts Tuberculosis League, Inc., E. O. Otis, Boston M. & S. J., July 10, 1924, cxci, 55.*—(*B. T. Mc. M.*)

London Statistics of Tuberculosis Mortality in Relation to Age and Occupation.—Figures have been obtained from the Registrar-General for the number of deaths from pulmonary tuberculosis among males in the County of London during 1921–1922, set out according to age groups and occupations. These have been carefully analyzed and set out. One must always remember that there are many fallacies in connection with death returns and occupation and must distinguish in detail between particular phases of a general occupation, as they may entail very different conditions. Broadly speaking, three factors influence the mortality rate from pulmonary tuberculosis in an industry: (1) the number of "weaklings" or "susceptibles" in that industry; (2) the character and conditions of the work and (3) the general habits of those employed. We know that a certain number of boys at the start of their working life are below the average physical standard and more prone to develop tuberculosis. These usually choose an occupation more suited to their physical fitness. On the other hand, some occupations *per se* show an increased tuberculosis mortality. First of all, it is interesting to compare the tuberculosis mortality curves of the "occupied" and the "unoccupied." The latter show a very large mortality rate in the early years, falling rapidly after 35 years, and after 45 years becoming lower than the corresponding rate for the "occupied." It is, therefore, suggested that the height of the mortality rates in the early age groups in any particular industry indicates the proportion of weaklings and unfit, while the rates in the later age groups indicate the degree to which occupation or associated conditions are responsible for disease. *Class 1: Occupations with higher than average total rates:* This includes agricultural occupations, makers of brick, pottery and glass, workers in leather goods, hides, etc., marine and transport workers, and boot and shoe makers and repairers. Of the agricultural group, 74 per cent were gardeners, who are probably mainly weaklings and derelicts, since for the whole country agricultural workers have a very low rate. The marine and transport workers include stewards, who may have an unduly large proportion of weaklings. Living quarters and accommodations are generally poor in this group, while alcoholism and exposure are common. The mortality among ships' fire-

men is 700 per 100,000 as compared with 89 for locomotive drivers and firemen. The latter are probably much better selected and housed and also work in the open. *Class 2: Occupations with high early age mortality and low later mortality:* This includes watch and clock makers, makers of foods and drinks, and tobacco-workers; also carpenters, clerks, insurance officials and agents, commercial travelers, painters and warehousemen. Many of these occupations are such as would attract the physically unfit. *Class 3: Occupations with low early and high later mortality:* This class includes tailors and fitters principally. The explanation is offered that most of the London tailors are Jews who tend to develop a chronic fibroid type of disease. Personal servants and porters also fall in this group. Here alcoholism may be an important factor. *Class 4: Occupations with low total mortality in both age groups:* Among such are tram-drivers, bus and tram-conductors, and motorcar-drivers. The drivers of horse-drawn vehicles have a much higher mortality. Selection, lighter work and possibly better clothing and housing may cccount for the lower rates of the former. Cabinet-makers also show a very low rate. After a careful consideration, a list of occupations thought suitable for the "susceptible" or ex-patients is given. This includes many diverse fields, mechanical, agricultural, industrial, commercial, and transportation. It is necessary to know the details of an occupation before recommending it.—*Memorandum and Tables on the Mortality from Pulmonary Tuberculosis of Men in London, for the Years 1921 and 1922, in Relation to Age and Occupation, W. B. Knobel, Tubercle, June, 1924, v, 409.*—*(A. P.)*

Tuberculosis in France.—To France falls the melancholy distinction of the highest general death-rate and tuberculosis mortality among civilized nations. For each 112 deaths in England from pulmonary tuberculosis there are 190 recorded in France, and, if the deaths reported from chronic bronchitis be added, over 100,000 persons die each year from tuberculosis in all its forms. The number of living tuberculous patients is estimated at 600,000. While in England from the beginning, ideas of combating tuberculosis were centered on the elimination of the distribution of the tubercle bacillus, in France, although Calmette, in 1900, initiated a dispensary system and Grancher, in 1902, started an excellent system for the protection of children, there was before the war no concerted action, and there were only 30 dispensaries and 10 sanatoria, with a total of 862 beds. It was the war, with its large quota of men invalided on account of tuberculosis that furnished the impulse for further measures. In 1915 a program was passed providing for a credit of 2,000,000 francs to assist tuberculous soldiers; the gradual creations of 29 sanitary stations or improvised sanatoria with 2500 beds; the organization of 49 hospitals for observation and special treatments, with 8000 beds; county care committees charged with assisting and educating in preventive measures, together with a central committee for the Prevention of Tuberculosis under the presidency of Leon Bourgeois. In 1919, there was passed a Sanatorium Law with compulsory clauses, each county to provide one sanatorium within ten years, and with State assistance in the initial expenditure and upkeep. In July, 1917, the Rockefeller Foundation sent a commission to France, which for five years coöperated in a limited and well-defined program, having the advantage of important financial resources and a highly trained personnel. In 1923, its tasks were handed over to the *Comité National*, which has increased the scope of its work. It has also founded a colony (Taxil) for training patients in outdoor occupations, and directs a school for visiting nurses. The number of sanatorium beds has increased in ten years from 912 to 6,500, including those in general hospitals and training colonies. There are 53 institutions with over 11,000 beds for children with surgical tuberculosis, three being in the mountains, the others by the sea. In France sanatorium patients are more rigidly selected than in England, and many of the sicker patients are still cared for in the general wards of hospitals. There are also dispensaries in 65 counties, the total number being 450. In many, radiographic and laboratory service has been established and a special medical staff recruited. As a rule the dispensaries give no treatment, their function being consultative and preventive. There is already evidence of the effect of all this work in a diminished tuberculosis mortality. In Lyons it has fallen from 3.54 per 1000 in 1900–1905 to 2.45 in 1918–1923, and on the left river bank, where the working-class quarters are located and dispensaries most active, from 3.85 to 2.15, whereas in another district peopled by bourgeoisie and without dispensaries it remains the same. In the department of Oise 23 per cent of patients were referred by local practitioners, and nearly one-half of the definitely diagnosed and sputum positive cases. The tuberculosis problem is perhaps greatest in the rural districts where dwells the bulk of the population of France, and where the mortality is usually higher than in the towns. Finis-

terre has organized traveling dispensaries for its population of a million people. Preventive work among children has been long carried out by preventoria, first established by Grancher, of which 81 now exist, caring for 5,000 patients. Only noninfectious cases are accepted, and the treatment consists in hygienic measures, open-air life, and physical training. Postnatal care is carried on at such places as the Laennec hospital *crêche*. It has been shown that 75 per cent of infantile tuberculosis is due to maternal infection and the child should, therefore, be separated from the mother immediately after birth. A scheme for boarding out young infants from tuberculous families has been inaugurated, based on the tuberculosis *crêche*. The departments in the Gironde, the Rhone, and the Oise are contemplating similar work very shortly. Finally, should be mentioned medical inspection of schools, open air schools, and holiday colonies.—*Tuberculosis in France, Evrot (translation by E. Ward), Tubercle, March, 1924, v, 257.*—(*A. P.*)

Tuberculosis Situation in Vienna.—During the last years of the late war and for a year or two thereafter the death rate from tuberculosis was very high—more than double the rate for 1914. It is encouraging, however, that this mortality rate is now (1923) lower than it has been since 1912. The high rate in 1917 to 1919 was without doubt due to malnutrition, entrance of women and children into industry, etc. But a significant fact is that the number of living children in 1918 was only one-half that in 1914 and of these 45 per cent were considerably undernourished. These children will by 1928 begin to leave school and enter upon their life's work. Whether they will then be able to withstand the hardships of industrial life is an important question. Their capacity to do this will influence materially their tuberculosis mordidity. The aid societies are in a perilous condition financially and will be unable to cope with the situation. Social agencies must do preventive work for these children through the parent schools and kindergartens. Twenty-five hundred children in Vienna are now being given supplementary feeding at school. There should be coöperation between municipal and private agencies especially as they concern the care of children. In Vienna there are 2,000 beds for those sick with tuberculosis.—*Die Bekämpfung der Tuberkulose in Wien Böhm, Wien. klin. Wchnschr., February 21, 1924, xxxvii, 179.* —(*H. S. W.*)

Tuberculosis Mortality in Vienna.—The deaths from tuberculosis among the population of Vienna since 1912 are as follows:

ALL FORMS OF TUBERCULOSIS		PULMONARY TUBERCULOSIS	
Year	Deaths	Year	Deaths
1912	6,393	1912	4,924
1914	6,223	1914	4,940
1915	7,810	1915	6,260
1916	9,650	1916	7,842
1917	11,741	1917	9,650
1918	11,531	1918	9,306
1919	10,600	1919	8,539
1920	7,464	1920	5,660
1921	5,265	1921	3,936
1922	5,552	1922	4,342
1923	4,430*	1923	3,793*

*Estimated.

Mutual life insurance companies take care of a certain number of persons sick with tuberculosis, and companies other than mutual provide care for a few. Reporting of tuberculosis has become very faulty, largely because nothing is or can be done for the patient, and physicians are lax in the matter. A new law has been passed which requires complete reporting of cases of the disease and of deaths from it.—*Tuberkulosebekämpfung in Wien, A. Götzl, Wien. klin. Wchnschr., February 21, 1924, xxxvii, 181.*—(*H. S. W.*)

Control of Pulmonary Tuberculosis.—There has been an enormous diminution in the morbidity and mortality of pulmonary tuberculosis during the last sixty years, yet the machinery for its control is very incomplete. Little further progress may be expected unless the highest standards are applied everywhere and existing knowledge is put into practice as well as accepted in theory. *Early diagnosis* followed by adequate treatment will increase very materially the chances of recovery and will prevent the passage of the case to the later stages. Early diagnosis may be difficult at times because of lack of definite symptoms and unequivocal signs, but observations of the temperature and study of the sputum for bacilli will be of great help. Also, examination of groups of people—in certain occupations, families with poor standards of health, convalescents from febrile or other diseases—will frequently disclose early cases of tuberculosis and is more desirable than

examination of contacts. *Early notification* is also very desirable, but so long as disadvantages to the patient outweigh the advantages of reporting the case, reporting will continue to be poorly done. Responsibility for reporting and care of the sick should rest definitely upon one person, and authority cannot be divided. Patients must be followed for a much longer time than is usually supposed for the duration of disability and the potentially infectious stages of the case may continue for years. Present *preventive measures* are inadequate. Carried out blindly as they are, they amount to this: disinfecting living quarters, supplying disinfectants and sputum flasks and forbidding certain occupations. Distinction should be made between the dangerously infectious, slightly infectious and noninfectious. "For the first, stringent precautions are necessary; for the second education; the third set should not be vexatiously harried." Disinfection of the premises is like closing the stable-door after the horse is stolen. More stress upon cleanliness and less upon disinfection will yield better results. All such measures should depend on the coöperation of the instructed patient rather than on compulsion. *Isolation* is impossible and seldom necessary. *Remedial measures*—hygienic, economic, medical—depend upon coöperation of the well-taught patient. Sanatorium treatment is vastly helpful but usually not curative. With limited bedspace those early cases with the best chance of recovery should be admitted and kept an adequate time, to the exclusion of the far-advanced cases which should be cared for at home. To send all cases indiscriminately to sanatoria for a given time is bad practice. Besides other evils, it leads to long waiting lists. Waiting lists should be divided into two sections, one for favorable cases and for urgent admission. *Home treatment* is the weakest point in the entire problem. A sanatorium regimen should be intelligently enforced, usually not by the general practitioner but by some one trained in sanatorium methods. Doctors, nurses, health visitors, patients and the general public need nothing so much as systematic antituberculosis education. "*After-care* begins when treatment is ended" and is of greatest importance.—*The Coördination of Measures for the Control of Tuberculosis of the Lungs, F. R. Walters, J. State Med., March, 1924, xxxii, 117.*—(*H. S. W.*)

Antituberculosis Campaign in Fifteenth Arrondissement of Paris.—The excellent work accomplished by the Office of Public Hygiene of the Department of the Seine needs no comment, but in this particular district it receives valuable aid from private sources which were the first to be set in motion. In 1916, the examination and rehabilitation of former soldiers was begun, in which work Letulle rendered valuable aid in consultation; later, interest extended to the families of these soldiers. After the war, the president of a section of *L' Union des Femmes de France*, Mme. Jovignot, lent valuable support in establishing the first antituberculosis dispensary of this district under the auspices of the Red Cross. During the year from April 1, 1923, to April 1, 1924, 319 tuberculous adults with positive sputum received advice, and 231 children with tracheobronchial adenopathy, and 83 cases of nonpulmonary tuberculosis. Altogether 7,408 persons were seen, and 1,203 radioscopic examinations made, and 1,268 sputum examinations. The visiting nurses made 7,159 home visits and distributed 700 sputum cups, as well as giving other valuable advice. There has been little or no hostility manifested by the medical profession and should not be if the legitimate interests of practising physicians are considered. Financial aid has been extended when deemed necessary. The association has procured 3,783 days of sanatorium treatment for 27 patients. Private work possesses a greater adaptability and elasticity than that under public auspices, and, directed by women of persuasive charm and benevolent ardor, can achieve remarkable results in the way of propaganda and prophylaxis.—*Un aspect de la lutte antituberculeuse: la collaboration de l'office public et de l'initiative privée dans le XV^e^ arrondissement de Paris, A. Bergeron, Presse Méd., June 18, 1924, no. 49, p. 1027.*—(*A. P.*)

Industrial Hygiene in Control of Tuberculosis.—A general article too elaborate for making a suitable abstract and should be read in the original. A general adherence to hygienic rules in the industries is advocated, with regular periodic examination of the workers in the dusty trades. English and American studies are complimented and their methods pointed to as examples to be followed.—*Ergebnisse oder Übersichtsberichte. Die Bedeutung der Gewerbehygiene für die Bekämpfung der Tuberkulose, F. Koelsch, Centralbl. f. d. ges. Tuberk.-Forsch, November, 1923, xxi, 1.*—(*H. J. C.*)

Tuberculous Infection.—Numerous diseases, such as measles and smallpox (or vaccination) are universal, in that practically everybody has them. Those who have had these diseases have immunity. Tuberculosis is also widespread but it does not confer

effective resistance. Tuberculosis dates back into very remote times, but it apparently did not exist in all parts of the world until western emigration spread it. In certain tropical countries tuberculosis is about as prevalent as it is with us and the type of chronic tuberculosis resembles ours. In certain other tropical countries, the disease occurs but infrequently, but when it does occur it is frightfully malignant and its deathrate is very high; it becomes epidemic and is often characterized by massive caseous pneumonia and by lack of fibrous reaction. The American Indian suffers also from this type of tuberculosis—a type which develops in soil unacquainted with the disease or the infection. Latent infection is of great value in producing resistance to the disease. Children have acute tuberculosis as a type; adults, chronic tuberculosis. Children are enabled to resist the infection increasingly better with increase in age, and the tendency to heal by fibrous tissue formation, especially in lung tuberculosis, increases apace with age. The type of pulmonary tuberculosis differs in children and adults. Latent tuberculosis of adults has the characteristic distribution of pulmonary tuberculosis in children; that is, it is not necessarily apical. The typical pulmonary tuberculosis of adults is situated apically, is chronic, ulcerative, and tends to cavity formation and fibrosis, while pulmonary tuberculosis of children, on the other hand, is not necessarily apical, is acute and progressive and is in lymphatic nodes. The adult lung tuberculosis is like a second infection in animals. There is no sharp line to be drawn between latent tuberculous infection and tuberculous disease. "Latent tuberculosis in children in many instances has passed through a stage in which it has been a source of grave danger to the affected child." Masked juvenile tuberculosis may be recognized by history of frequent coughs and "colds," of anorexia, loss of weight, unexplained fever, weakness. It may be that what is sometimes diagnosed "incipient tuberculosis" is in reality latent phthisis. The inoculation period in young children is very short—may be as short as thirty days, but it increases with increasing age up to perhaps much longer than ten years at times in adults. There is but little evidence to support the idea that adult tuberculosis comes from childhood infection. A first infection produces an immunity against subsequent infection, but this immunity is only relative and never absolute. It disappears with healing and when present depends upon the virulence of the bacilli which are used to produce it. The evidence of infection (and immunity) as determined by skin tests is found to have a rapid rise in the early years of life (witness figures of Pirquet, Hamburger, Veeder and Johnson) and, as shown at autopsy on bodies of children dead of other diseases than tuberculosis with X-ray study of the lungs after their removal from the body, signs of infection are found as follows: under two years none; two to five years, 27.3 per cent; five to ten years, 33.3 per cent; ten to eighteen years, 62.5 per cent. It appears that tuberculin sensitiveness disappears in persons who have made clinical recovery from tuberculosis. Of 124 children with tuberculosis and recovery, skin reactions disappeared in 49 within one year of recovery, in 32 within two years, in 18 within three years, in 15 within four years and in 10 within five to seven years (Cronquist).—*Widespread Tuberculous Infection of Healthy Individuals and Its Significance, E. L. Opie, Bull, N. York Tuberc. Ass., 1924, v, no. 1, 5, and no. 2, 3.—(H. S. W.)*

Mechanism of Respiratory Tract Infection.—Curiously enough, respiratory infections, or communicable diseases whose portal of entry is the respiratory tract, such as pneumonia, influenza, scarlet fever and the common cold, are those least under control and continue to take a high toll of mortality. Tuberculosis, to be sure, has been reduced in incidence and malignancy, but no very direct weapon against it has been devised. Tradition has imposed on us the idea that the mouth is a specially favorable situation for bacterial growth, but certain facts do not accord with this view; hence a series of experiments has been carried on, in order to study the fate of bacteria introduced at various sites into the upper air passages. Solid masses of bacterial growth from agar were implanted on the tongue, pharynx, nasal septum and tonsillar crypts of volunteers, all healthy normal people. At intervals cultures were made from these points and the number of bacteria recovered estimated. *B. coli, Staphylococcus, B. influenzae, B. Friedländer* and *Streptococcus hemolyticus* were studied. Within twenty-four hours practically all had disappeared, although in the case of the tonsillar crypts a few occasionally persisted several days. Material placed on one side of the tongue remained confined to that side, and the path of progress was always backward. In some experiments with charcoal, the tonsils were not found to catch the material as might be supposed. In summary, there exists in the mouth a highly organized mechanism for eliminating foreign particles and bacteria. The backward sweep is evidently due to

suction currents set up by the muscles of the mouth and pharynx. A similar rapid elimination of bacteria occurs from the basal passages. Saliva appears to be an unfavorable medium for most microörganisms, and is more acid than generally supposed (pH 7.1). There is, however, a group whose natural habitat or facultative habitat appears to be the mucosa of the mouth and upper air passages. These are chiefly nonhemolytic streptococci. Intensive scrubbing of an area of the tongue for fifteen to thirty minutes, and application of strong antiseptics, failed to destroy them completely. This recalls Welch's experiences with *Staphylococcus albus* in the skin. Dosage of bacteria introduced is undoubtedly a factor in determining whether clinical infection will result, even though certain bacteria or viruses in small doses will almost invariably produce disease, such as measles, among primitive peoples. It has, however, been shown (Glover) that in the case of the meningococcus a small percentage of carriers constantly exists without causing epidemic disease; when this percentage was greatly increased, as in congested barracks during the war, an outbreak of meningitis occurred. There is also evidence to show that bacteria are more dangerous when they reach their hosts in a highly vegetative stage. Injuries to the upper air passages, physical, chemical, or mechanical, promote bacterial invasion. Cold acts through causing reflex vasomotor disturbances (Mudd, etc.). Anesthesia abolishes protective reflexes. Infectious diseases, the exanthemata *par excellence*, especially measles and influenza, let down the bars to other infections. Applying these facts to the problem of tuberculosis infection, it may be questioned whether every tubercle bacillus which enters the nose or mouth actually causes or threatens invasion of the body; therefore, a reduction of bacilli in the environment without total elimination may yet materially decrease the incidence of tuberculous infection.—*On the Mechanism of Respiratory Tract Infection, A. L. Bloomfield, Tubercle, June, 1924, v, 438.*—**(A. P.)**

Animal Sources of Human Tuberculous Infection.—During the past 20 years it has been shown that a transmission of animal tuberculosis to man occurs. The extent of this, however, is variously viewed, both as to the extent and severity of the tuberculosis developed. Determinations are made difficult because of the dispute regarding transmutation. The individual types are fairly constant. Weber found that a bovine type remained constant in man for ten and one-half years and concludes that there is an absolute constancy of type. This opposes the views of many others. Change of types is accepted by many (Eber, Dammann, Müssemeier, Rabinowitsch, Klimmer, etc.). The data presented indicate that the wide changes in virulence and cultural characteristics are possible. The literature contained 1,509 cases of tuberculosis in children (under 16 years) of which 26 per cent were due to bovine bacilli, while of 1,436 adult cases only 6 per cent were of bovine origin, but this may not indicate a change of type. The frequency of the bovine type varies not only with age but also with the diseased organ. The bovine type is often found in harmless cases of tuberculosis, but there are severe cases recorded. The transmission of animal tuberculosis to man is primarily by way of the digestive tract, especially through milk and milk products; meat is of little importance and eggs insignificant. Wound infections are not so rare. In 1913, cattle in Germany were tuberculous to the extent of 25 per cent, goats 0.8 per cent, and sheep 0.14 per cent. Cows are more often tuberculous than are bulls or steers. With increasing age the tuberculosis incidence in cattle rises. Not all tuberculous milk-cattle excrete bacilli in the milk. In mammary-gland disease this usually happens. Even in the absence of mammary-gland tuberculosis bacilli can be present in the milk, part of which may be due to unclean habits, although the bacilli can enter through the blood, and small tubercles exist in the udder. The udder is more heavily affected in generalized tuberculosis than is usually considered. Udder tuberculosis exists in 1 to 2 per cent of tuberculin-reacting cattle, 3 to 6 per cent when tuberculosis is found at slaughter, and 20 to 30 per cent when generalized disease exists. Milk from tuberculous udders can remain unchanged for 1 to 4 months after the beginning of the disease, but such milk can contain 50,000 to 1 million tubercle bacilli per cubic centimetre. With udder tuberculosis the milk becomes thin and watery. The bacilli in milk and milk preparations, including cream, cheese, butter, etc., is considered in detail. The number of bacilli necessary to produce infection through these products is considered. As a prophylactic measure these preparations should be boiled or pasteurized. The various temperatures and time intervals required to kill the bacilli are given. A campaign against cattle tuberculosis should be waged, and is important prophylactically. The avian-bacillus infection of chicken tuberculosis should also be combated since cases of this are reported in the literature; 0.2 per cent of all cases studied bacteriologically (3,357) in man were of

this type. All cases should be suspected in which acid-fast bacilli are found nonpathogenic for guinea pigs, but pathogenic for rabbits and fowls. The transmission from fowls is by means of insufficiently heated meat and eggs. About 10 per cent of chickens are tuberculous.—*Ergebnisse oder Übersichtsberichte: Die Bedeutung der Tiertuberkulose für die Ausbreitung der menschlichen Tuberkulose, M. Klimmer, Centralbl. f. d. ges. Tuberk.-Forsch., September, 1923, xx, 289.*—(*H. J. C.*)

Mouth as Portal of Entry for Tubercle Bacilli.—After tying off the esophagus and trachea in rabbits tubercle bacilli were placed in the mouth, on the cheeks, tongue and gums. In no case did guinea pigs receiving the blood of these animals by subcutaneous injection develop tuberculosis, while tubercle bacilli were found in the submental and submaxilliary lymph nodes thirty-six hours after painting the mucous membranes of the mouth with tubercle bacilli. The possibility of a mouth infection is thus demonstrated, the bacilli passing through the intact mucous membranes to the regional lymph nodes.—*Experimentelle Untersuchungen über die Mundhöhle als Eintrittspforte des Tuberkelbazillus, A. Puppe, Beitr. z. Klin. d. Tuberk., April, 1923, lv, 63.*—(*H. J. C.*)

Exogenous Reinfection in Tuberculosis.—The question is asked whether the relatives of consumptives more frequently develop tuberculosis than those in healthy families. Among 1¼ million persons, in 1919 to 1921, there developed 5.4 per 1000 cases of open tuberculosis, while of 833 relatives (or close associates) in 244 families of open cases during 1919 to 1921 there developed 27 cases, or 32.4 per 1000. Is the development of the two cases in a family sufficiently close together so that infection from one to the other is probable? The second case occurred during the life of the first twenty times; within one year of the death of the first five times; and within two years of death twice. That a reinfection (exogenous or endogenous) is being dealt with is probable from the chronic course and limitation to the lung (tertiary form of Ranke). Among the adult relatives of tuberculous persons tertiary open pulmonary tuberculosis was three times as frequent as among the adult population in general. Is the disease dependent on family predisposition or exposure to injection? In families, beyond criticism from a hygienic standpoint, there were only 1.9 per cent of tuberculosis relatives, while among the unhygienic there were 4.9 per cent. Questioning of 100 open tuberculous and 100 nontuberculous revealed that the former had been 2.7 times more frequently, to their knowledge, in association with tuberculous individuals than the latter. Since a cough droplet can contain 5000 (Hollmann) to 19,000 (Hippke) tubercle bacilli, it is easy to understand the significance of exogenous reinfection.—*Beitrag zur Frage der exogenen Reinfektion bei Tuberkulose, Braeuning, Beitr. z. Klin. d. Tuberk., May, 1923, lv, 127.*—(*H. J. C.*)

Phthisiogenesis.—The anatomo-pathological classification of Albrecht, according to the consecutive processes in chronic pulmonary tuberculosis, is stressed. He was the first who, under the stimulus of A. Fraenkel, in 1907 gave a classification based upon anatomic findings. It was a division into cirrhotic processes, nodular and caseous pneumonic tuberculosis, in which he differentiated the three groups, with and without cavities. Aschoff's recognition and elaboration is acknowledged, and finally it is pointed out that no one has opposed the Albrecht classification basically. The majority of later classifications (Fraenkel and Gräff, Nicol, Romberg, Ulrici and Bacmeister) have taken over the Albrecht scheme. A critical consideration of phthisiogenesis is then given. The earlier view of hematogenous spread in the genesis of chronic pulmonary tuberculous processes is again emphasized, as opposed to the view of Aschoff and his pupils who believe in a bronchogenic origin. The opinion of Puhl, of a hematogenous reinfection in conjunction with a primary complex leading to a generalized stage, is not acceptable, since the second stage of Ranke's classification is the weakest link in this conception; aside from other criticisms, generalization can occur even long after tertiary foci, in the sense of Ranke, exist. A hematogenous (endogenous) reinfection, contrary to the view of Puhl, can also occur from encapsulated or even calcified primary foci. An exchange of blood and lymph with the encapsulated focus must exist; otherwise how could coal pigment deposit or even calcification occur. That a massive exogenous reinfection can occur, even in the absence of a high predisposition, is admitted, but the possibility of endogenous reinfection is much greater. The author's views are again summarized as follows: Primary infection occurs in the majority of cases by inhalation into the lungs and can occur in all parts of the lungs, but rarely in the apices. From the primary complex, and especially from the lymph nodes, an extension along the lymph vascular system can occur. The majority of the apical reinfections occur endogenously *via* the blood stream. The localization of exogenous rein-

fection is on the average like that of the primary infection. In the further development of pulmonary tuberculosis an important rôle is played by renewed endogenous reinfection. As a logical sequence of this view pessimism is expressed regarding our present protective measures toward infection, and more is expected from general social hygiene and strengthening of the body. "The first line of defense lies in maintaining the nonspecific protective mechanism of the body continually mobilized."—*Bemerkungen zur Einteilung und Entstehung der anatomischen Prozesse bei der chronischen Lungentuberkulose, Huebschmann, Beitr. z. Klin. d. Tuberk., April, 1923, lv, 76.*—(*H. J. C.*)

First Progressive Extension of Pulmonary Tuberculosis.—At the Hôpital aux Enfants Malades at Paris, 80 per cent of children at the age of eight years react positively to tuberculin. From that age upward tuberculous infection no longer behaves as a primary infection but as a reinfection. The first manifest extension of disease or the first evidence of disease in contradistinction to infection is here discussed. The author is a proponent of endogenous reinfection on the basis of this study of 32 children from eight to thirteen years of age, all of them showing their first manifest tuberculosis not more than four months before coming under his observation. The first point is that in 31 of these cases no open tuberculosis could be found in their surroundings despite a very careful investigation in this regard. On the other hand, in almost every case there had been in early life a source of infection such as would produce a slight and evanescent exposure of the infant. For example, 12 children eleven to thirteen years old lost their parents with tuberculosis at three to six years of age, without having actually lived with them: 9 children were in the country and saw the tuberculous parent but rarely, while the fathers of 2 children died of tuberculosis during army service and had seen their children only when on furlough. So, with all the series there was good evidence of early slight infection, whereas no evidence of exogenous infection could be found to explain the later outbreak here studied. Endogenous reinfection must therefore be invoked, depending upon a lowering of resistance, and a state of anergy through one cause or another replacing that of allergy. In the author's series, in almost every case one of the anergy-producing illnesses (measles, grippe, pertussis) had occurred not longer than six months before the outbreak of manifest tuberculosis. Nine cases had had measles, 6 had pertussis, there were 2 cases of grippe, 3 cases had chorea, 1 complicated by articular rheumatism, 2 cases had scarlet fever and there were 4 which had been operated upon for appendicitis. While the three last affections are not accepted as causing a tuberculous anergy, evidence is not lacking to show that they are not seldom the determining factor in lighting up an occult tuberculous infection. The clinical and pathological characteristics of this first manifest disease are distinctly different from those of primary infection in the infant and child and from the later extensions of disease in the adult. Two facts stand out, the rapidity of development of the lesions which within a few weeks end in the formation of softened caseous tissue, and the very special localization of the lesions. Some excavation of the lung was found radiologically in all of the cases of the series. Both physical signs and X-ray showed the lesions radiating out from the hilum and invading by direct contact the parenchyma of the hilum region. The author finds the appearance so distinctive as to merit its being called the anergic lesion of pulmonary tuberculosis. Autopsies confirmed this appearance of initial lesions about the hilum. Summed up, this study indicates that the first manifest extension of tuberculosis, in the immense majority of cases, results from endogenous reinfection following upon the lighting up of a latent occult lesion through the production of anergy. The moral is to protect the child from the anergy-producing diseases, particularly the child who is suspected of harboring slight lesions.—*La première poussée évolutive de tuberculose pulmonaire, J. Paraf, Ann. d. Méd., Par., November, 1923, xiv ,431.*—(*W. B. S.*)

Experimental Studies on Phthisiogenesis.—Inoculation of human tubercle bacilli into the tonsils or soft palate in rabbits of different ages resulted in a tuberculosis running the course of pulmonary phthisis. Cavity formation resulted in 31 per cent and calcification in 37 per cent of the test animals; less frequently in young than in older animals. The amount of bacilli used was indifferent and led to uniform results whether only one or both tonsils were injected. The site of inoculation in young animals suffered little change, but in older animals it was more marked, which is attributed to the difference in resistance between the younger and older animals. The duration of life showed no relation to the amount inoculated; it varied in young animals from six to nine months and in old animals from five to eight months. The fact that the fully grown animals lived a shorter time after infection

is attributed to the changes at the inoculation site, causing difficulty in swallowing which resulted in nutritive disturbances. For this reason the older animals had greater loss in weight than the younger. In 2 animals killed one and two months after infection the pulmonary affection was indefinite and was limited to the alveolar walls. In the entire series the changes outside of the lung were slight and infrequent.—*Experimentelle Studien über die Entstehungsweise der chronischen Lungentuberkulose, K. Aoyama, Ztschr. f. Tuberk., May, 1923, xxxviii, 189.*—(*H. J. C.*)

Effects of Rebreathed Air on Guinea Pigs.—Within recent years the weight of authority has been against the notion that exhaled air contains any organic poison which renders it unfit for respiration. The discomfort experienced in crowded, unventilated apartments has been attributed to physiological reactions set up by combined high temperature and excessive humidity of the air; and lethal results, when they occur, have been explained as the outcome of the poisonous excess of carbon dioxide and insufficient content of oxygen. Evidence has also been presented which would indicate that exposure of animals, even on a single occasion, to air highly polluted with the products of respiration and with a high carbon-dioxide content, sufficient to cause dyspnea, often "sensitized," so that on later reëxposure, there is a perceptible modification of respiratory behavior. Admitting that rebreathed air, under most unfavorable conditions of actual ventilation, involves no perceptible deleterious effects upon *healthy* human beings, what effect does it tend to have upon that large proportion of people who harbor latent tuberculosis or incipient clinical tuberculosis? The following series of experiments were done in an attempt to throw light on this problem. Very briefly the procedure and apparatus were as follows: A guinea pig was enclosed in each of six large glass air-tight bell jars, communicating with each other in series through glass and rubber tubing, so that the animal in jar 1 breathed pure air while that in jar 6 respired the exhalations of the five preceding members of the series, etc. The system of ventilation was regulated by a filter suction pump connected with jar 6 and the rate of ventilation adopted, with a guinea pig in each jar, showed continuously a carbon-dioxide content of approximately 1.5 per cent in jar 6. The animals were removed from their jars every day for a few hours while the apparatus was cleansed. In the first series of experiments, a group of young male guinea pigs was inoculated each with one-millionth mgm. of virulent human tubercle bacilli. Six of these were assigned to life in the jars, the rest serving as controls. It was found that the average life of the four controls after inoculation was 185.5 days; while of six "jar" guinea pigs, dying within the same period, the average duration of life after inoculation was 116.3 days, an average excess of more than 69 days in the life of the control guinea pigs. Also, the guinea pigs subjected to an environment of rebreathed air with a high carbon-dioxide content, tend to an excessive development of pulmonary and a mediocre degree of abdominal tuberculosis, as compared with control animals, similarly inoculated. In the second series of experiments a group of guinea pigs was given 1,000 times the dose of tubercle bacilli that series 1 received. Six of these were used in the jars and 8 were reserved for controls; at the end of 54 days all were killed, and autopsy findings compared. It was found that the pathological condition of the animals subject to rebreathed air, and especially the pulmonary infection, was more profound and extensive than that of the controls and was in more or less direct proportion to the amount of deterioration in the air breathed. A third set of guinea pigs were inoculated, using the same dosage as in group 1, and clinical tuberculosis was allowed to develop before confinement in the jars was begun. Clinical deterioration of the animals of the series was found to be far greater than seemed accounted for by the extent of their tuberculosis, so that no definite conclusions could be drawn from the experiment. In general, these results do not prove that fouling of the ventilating current by rebreathed air is the only deleterious agent in the case. Mere confinement of the animal (at a relatively high temperature) but in pure air, as in jar 1, is probably inimical to health. Finally, the evidence collected indicates that in rebreathed air the tuberculous process is somewhat prone to selective invasion of the lungs, with possible complementary escape from infection of the abdominal organs.—*The Effects of Rebreathed air on Tuberculous Guinea-pigs, H. Sewall and H. Gutstein, Tubercle, June, 1924, v, 426.*—(*J. S. W.*)

Pulmonary Tuberculosis and Pregnancy.—Pregnancy frequently but not always exerts a baneful influence upon tuberculosis when it coexists with that disease. Study was made of a large number of cases which fall into the following groups: (1) cases under observation throughout the entire period of pregnency and followed after delivery, (2) cases diagnosed for the first time only after onset of pregnancy, and (3) cases with tuberculosis and a history of

pregnancy. During the early months of pregnancy an unfavorable influence upon the tuberculosis is much more likely to be exerted than during the later months. In this early period disturbance due to tuberculosis—weakness, loss of weight, elevation of temperature, pleurisy pains, increase of cough with bloody sputum—frequently arise but after about twelve weeks these tend to subside and the very last months of pregnancy seem not to influence the tuberculosis at all and may even be beneficial. But the most dangerous period comes at the time of labor and puerperium. Often in the first to the third week of the puerperium symptoms of acute tuberculosis develop, and occasionally miliary tuberculosis. Symptoms of an acute exacerbation of the tuberculosis often antedate by a week or two the appearance of signs in the lungs. Not all cases by any means have an exacerbation just after labor, and it is important to know that no hard and fast statements can be made. Patients are individual in the matter of their reaction, and what might produce in one woman an exacerbation of her tuberculosis might in another have no deleterious effect. More severe cases sometimes take a favorable turn and more favorable cases sometimes do badly. One should tell the patient that she carries a somewhat added risk. Interruption of pregnancy usually does no good. If it is done, it should be done before the third month. Advice to the patient as to pregnancy is important and must be made according to all the facts in the individual case,—the patient's age, her physical condition, whether she has borne children before, etc. If nursing the infant proves to be a great drain upon the mother's physical reserve, it should be discontinued.—*Tuberkulose und Schwangerschaft, A. Sternberg, Deutsche med. Wchnschr., April 4, 1924, 1, 428.*—(*H. S. W.*)

Pulmonary Tuberculosis and Pregnancy.—Certain women have physical handicaps which alter their capacity to go through pregnancy normally. The general capacity of tuberculous women to bear children is lower than that of normal women. Pregnant women with tuberculosis often have a reduced reacting capacity to tuberculin, that is, they tolerate larger doses of tuberculin than they did before the pregnancy, and this has led to the belief that they are less resistant to tuberculosis. This does not appear to be true. Some women do well with their tuberculosis during pregnancy, but they are women who would do so in health. The type of prognosis—relatively favorable, doubtful, unfavorable—of the tuberculosis has a great deal to do with the manner in which the patient tolerates her tuberculosis during pregnancy. The great essential is prevention of conception. Conception may be allowed in women who have a good prognosis and but a slight amount of tuberculosis; it should by all means be advised against to those with indifferent prognosis. The obstetrician and internist must confer and must keep under close observation the tuberculous patient who becomes pregnant. In the earlier months of the pregnancy a certain number show an improvement in their tuberculosis; others, however, become worse during the functional changes which occur at this time. In the later months mechanical pressure on the lungs by the enlarging uterus may be beneficial. The mechanical factor at the time of labor—pressure changes in abdomen and thorax, etc.—and the loss of blood often result in a rapid spread of the tuberculosis, metastatic and miliary disease being common in the puerperium. Women with tuberculosis may stand up under their first pregnancy only to have their tuberculosis cause their death after the second or the third childbirth. About 10 to 20 per cent of tuberculous women have a spontaneous interruption of the pregnancy, but in most of these cases prognosis is grave. The same is true of induced abortion. Congenital tuberculosis, even in children of mothers with far-advanced tuberculosis, is rare yet it does occur. The onset of pregnancy can influence adversely the course of tuberculosis by producing an additional functional handicap and in such ciruumstances abortion may be induced in the first three months, but not in the later months. When such interference is necessary, it should be done with the least strain to the patient, and conception thereafter should be avoided until such a time as the mother can go through the pregnancy with minimal danger to herself and can bear a normal, healthy child. The biological basis for the immunity upset in tuberculosis through pregnancy is not clear.—*Tuberkulose und Schwangerschaft, G. Liebermeister, Klin. Wchnschr., March 11, 1924, iii, 433.*—(*H. S. W.*)

Pulmonary Tuberculosis and Pregnancy.—As a result of the study of 8 cases it is concluded that pregnancy has an unfavorable influence on an existing tuberculosis. An early artificial interruption has a favorable influence upon the further course of the disease. The absence of fever, loss of weight, hemoptysis or bacilli in the sputum does not necessarily indicate a subsequently favorable prognosis if the pregnancy be allowed to go on. The indications for interruption of pregnancy are not

definite, since the case may progress unfavorably only at a later period. Every case of manifest tuberculosis should have pregnancy interrupted. Even in latent tuberculosis interruption of pregnancy is recommended provided it occurs shortly after latency has taken place.—*Schwangerschaft und Lungentuberkulose, F. Melion, Ztschr. f. Tuberk., July, 1923, xxxviii, 321.*—(*H. J. C.*)

Trauma and Pulmonary Tuberculosis.—From 1916 to 1922 there were only 30 cases (0.6 per cent) of war lung wounds among 4,702 (3,050 civilian, 1,652 military) cases in the male division of the Ruppertshain Sanatorium. After the war of 1870 there was no appreciable number of pulmonary-tuberculosis cases among chest-wound cases. The figures of the last war are not yet completely available, but the incidence will probably not be high. The greatest number of lung wounds was during 1914 to 1916. In 1914 Kraska reported 320 penetrating chest wounds; 33 of these (10.2 per cent) died mostly as a result of secondary infections and purulent conditions. Tönnissen reported 56 lung wounds in 1915 with favorable course; Rotter reported 115 lung wounds with 14 deaths, Weiss 95 cases in 1915 with high mortality, Moritz 532 lung wounds with 28 deaths in 1916, Lonhard 100 chest and lung wounds with 34 per cent mortality in 1916. A direct tuberculous lung infection by inoculation of bacilli through traumatism is rare, or never occurs. As an indirect cause trauma might cause a localization of the bacilli from the blood. Broca believes this possible but rare. Schröder prefers to refer the tuberculosis to injurious influences (exposure to cold, hemorrhages, emaciation, lack of food, etc.) which activate the disease. Schittenhelm holds that the occurrence of tuberculosis on the basis of a lung wound is not rare. Frischbier and Austgen believe trauma a predisposing moment for the development of pulmonary tuberculosis; such trauma can activate a latent lung lesion, but a primary lesion from the war wound is rare. The types of war wounds are given with resultant chest wounds. The symptoms of lung wounds are hemoptysis, cough and expectoration, pain, dyspnea and fever. Hemoptysis is the most important sign of trauma and lung injury. It can occur immediately following trauma or even after several days. The amount of blood gives no clue to the severity of the lung wound. The absence of hemoptysis does not exclude a lung wound, since the blood can flow into the pleural space. Increased temperature and dyspnea were seen by Wassermann only 4 times among 20 cases. Fever is mostly due to secondary pleuritis with hemothorax, secondary pneumonia, secondary inflammations and purulent conditions; rarely from abscess formation or gangrene. The pathological changes noted are inflammation and gangrene of the lung, and serous pleuritis. Pneumothorax can occur early or late. Genuine pneumonias are rare but secondary pneumonias occur. Thirty cases are reported by the author. The general impression obtained from these is that the relation between the wound and the tuberculosis remains indefinite.—*Ergebnisse oder Übersichtsberichte. Kriegtraume und Lungentuberkulose, G. Schellenberg, Centralbl. f. d. ges. Tuberk-Forsch., June, 1923, xx, 1.*—(*H. J. C.*)

Primary Traumatic Cutaneous Inoculation of Tuberculosis.—*On Initial Traumatic Cutaneous Inoculation of Tuberculosis, H. Ito, Chugwai Iji Shimpo, June, 1923, no. 1037, Title from Japan Medical World, Dec. 15, 1923, iii, 275.*—(*M. M.*)

Relation of War Gas to Tuberculosis.—A board of medical officers, convened soon after the armistice, examined 2,000 cases with the purpose of determining the after-effects of war gases. They concluded that gassing produced no marked predisposition toward active pulmonary tuberculosis nor toward the reactivation of healed or quiescent pulmonary lesions; also that gas victims showed little evidence of destruction of lung tissue. In an investigation undertaken in 1921 by the Medical Division of the Chemical Warfare Service and lasting nearly two years, a great mass of data seemed to warrant the conclusion that gas was probably not a factor in the incidence of pulmonary tuberculosis, and that gassed patients who claimed to have developed tuberculosis subsequently would probably have become tuberculosis patients within a year after leaving the service if they had never been in the army. In pathological specimens collected for the Army Medical Museum none were found showing permanent lesions due to gas, but a few showed injury to the pharynx, trachea and bronchi. There seems to be evidence based on clinical and laboratory findings that gassing does to a certain extent prevent tuberculosis.—*Warfare Gas and Tuberculosis, Testimony of Dr. Albert P. Francine before the Senate Committee on Investigation of the Veterans' Bureau, Commented on by Col. H. L. Gilchrist, Military Surgeon, 1924, liv, 470.*—(*E. C.*)

Pneumokoniosis and Pulmonary Tuberculosis.—Chronic affections of the respiratory tract provoked by long-con-

tinued dust inhalation are often confused with pulmonary tuberculosis, and the differential diagnosis is often difficult. Those dusts which cause the most serious symptoms are the metallic and siliceous ones, the carbon dusts being less harmful. There are three distinct stages in the evolution of the disease: *1:* Stage of bronchial irritation, with dry cough and little sputum, either dark or yellow (in siderosis). Chest examination reveals only harsh respiration or perhaps a few sibilant and mucous râles. *2:* Stage of desquamative and ulcerative catarrh. All the respiratory symptoms are aggravated; the cough becomes frequent, sometimes asthmatic; expectoration is abundant, mucopurulent or blood streaked. There may be attacks of acute bronchitis and bronchopneumonia. The physical signs are those of chronic bronchitis with sometimes emphysema or bronchiectasis. *3:* Stage of impregnation of pulmonary tissue by the dust, with more or less extensive sclerotic lesions. Dyspnea is marked, and hemoptyses may occur frequently; physical signs are those of bilateral pulmonary infiltration, with breath-sounds either feeble or harsh, moist râles and zones of dulness. It is this stage which is most often confused with tuberculosis. The history is of greatest diagnostic importance. The vital capacity is almost always markedly diminished. The sputum is black in cases of anthracosis and yellow in siderosis, turning blue on treating with hydrochloric acid and potassium ferrocyanide. X-ray examination generally shows a characteristic picture different from that of tuberculosis. The densities are generally most marked near the hilum. The dark streaks and spots, and the confluent marbling toward the hilum, the base and apex being clear, are features; also the bilateral distribution of the lesions.—*Pneumoconiosis et tuberculose pulmonaire, A. Falloise, Rev. Belge d. l. Tuberc., April, 1924, no. 4, 123.*—(*A. P.*)

Tuberculosis and Influenza Epidemic.—Before the influenza epidemics of 1918–1919 and 1922 the view most generally held was that influenza seriously increased both the morbidity and mortality of pulmonary tuberculosis. In the investigation forming this study, particulars were requested from 536 consecutive patients consisting of definite cases of tuberculosis, "suspects" and contacts. From the data collected it appears that in their own homes the tuberculous suffered attacks of influenza at least as frequently as the population at large. The adult cases of pulmonary tuberculosis in residence at Barrasford Sanatorium and the tuberculosis wards at the city hospital escaped the epidemics almost completely. The isolation of the first-named institution may have accounted for its immunity; on the other hand it is difficult to explain why the hospital patients got off practically "scott free" as 50 per cent of the nursing and domestic staff were affected during the 1918–1919 epidemic. Postinfluenzal pseudotuberculosis and tuberculous pseudo-influenza caused considerable confusion in diagnosis. Acute influenzal pneumonia was found to be followed by pulmonary tuberculosis in a greater proportion of cases than was lobar pneumonia; the total number of cases, however, was small, and there was no evidence that influenza proper was a serious factor in increasing the morbidity of tuberculosis. While 19.9 per cent of the new sputum-positive cases registered between June 1, 1918, and June 30, 1920, ascribed their pulmonary tuberculosis to influenza, it has to be borne in mind that at least 20 per cent of the population at large suffered from an attack of influenza, and two patients with an artificial pneumothorax died of acute influenzal pneumonia. During and immediately after the 1918–1919 epidemic the death returns revealed an increase in the number of deaths from pulmonary tuberculosis; this increase can, in part at least, be ascribed to influenza. Since then the death rate from pulmonary tuberculosis has progressively declined and that of 1922 was the lowest ever recorded in the city.—*Observations on the Interrelations of Pulmonary Tuberculosis, Influenza and Pneumonia, W. H. Dickinson, Tubercle, July, 1924, v, 479.*—(*B. T. McM.*)

Relation of Influenza to Pulmonary Tuberculosis.—The relation of influenza to pulmonary tuberculosis is twofold and is based upon the answer to the following questions: *1:* What happens to tuberculous individuals developing influenza? *2:* Can influenza cause a quiescent pulmonary tuberculosis to flare up again in clinically healthy cases? As a subsidiary question, can influenza influence extrapulmonary infection to such an extent that pulmonary disease develops? No observations exist on the latter point. The answers to the general questions vary. Vaughan believes tuberculous persons relatively resistant to influenza, while cases with other diseases and healthy individuals are especially susceptible. Levinthal believes that influenza only influences tuberculosis when it occasions marked changes in the lungs. Liebermeister points out the diagnostic difficulties between tuberculosis and chronic influenza. Berliner, Bloomfield, Debré and Much point out that in latent and manifest tuberculosis with a positive Pirquet, the influenza causes a

change to a negative reaction (anergy) which becomes positive again only with convalescence. Thus, influenza has an unfavorable influence on immunity to tuberculosis. Seuffer believes a virulent influenza capable of producing a greater immunity, while Berliner found the antibodies in the blood uninfluenced. Müller found the Pirquet negative only in influenza-pneumonia and believes that the Pirquet is not influenced by the infection but by the severe general effect. The view of a common immunity to both influenza and tuberculosis (Deusch and Guggenheim) has its opponents (Burnand). Early in 1918 to 1919 sanatoria reported a favorable influence of tuberculosis on influenza (Jessen reported the opposite). Sonnenfeld and Ladek, Bochalli, Rickmann, Sappänen, Würtzen and Kieffer saw little severe influenza among consumptives. Wiese, Debré, Deusch and others saw benefit from the influenza. Rothgser believes in the fresh-air treatment of influenza and that in this way the consumptive was protected. Rolly, Wiese, and others believe that the different living conditions of consumptives, invalids and healthy people account for much of the difference. A large number of authors report that after influenza a latent tuberculosis may become manifest disease. The frequency of this is uncertain. The relation of influenza to the type of tuberculosis is considered, as is also the effect on the various stages, but the findings are inconclusive. In severe cases of pulmonary tuberculosis influenza is a grave complication: 50 to 80 per cent of all cases of pulmonary tuberculosis developing influenza-pneumonia are fatal. Influenza-pneumonia and artificial pneumothorax are usually fatal regardless of the grade of artificial pneumothorax. The complication of influenza with tuberculosis in children is always serious. Secker and Marquio noted a greater disposition to tuberculous meningitis in children with influenza, as is seen in measles and scarlet fever.—*Ergebnisse oder Übersichtsberichte: Über die Beziehungen der Grippe zur Lungentuberkulose, H. Deist, Centralbl. f. d. ges. Tuberk.-Forsch., August, 1923, xx, 201.*—(*H. J. C.*)

Alcoholism and Tuberculosis.—For a long time past a variety of statistics have been cited to show a close correlation between alcoholic intoxication and tuberculosis. Many of their sources and details have not been carefully examined. As a matter of fact, clinical teachers are not convinced that alcoholism predisposes particularly to tuberculosis, and phthisiologists scarcely mention it. Critical reëxamination and verification of the facts seem greatly needed. In the first place, it must be realized that the figures as to total alcoholic consumption of a people do not yield the slightest information as to the proportion of inebriates, which are those who are supposedly predisposed to succumb to tuberculosis. Also, the official reports deal only with the consumption of spirituous liquors, leaving out of account the alcohol in wine, beer and cider, which are commonly used for beverage purposes, and thus statistics are very incomplete. The usual statistical procedure has been, first, to scan the list of departments and their reported alcoholic consumption, and classify them; this is followed by a second classification arranged according to tuberculosis mortality. Groups are arranged more or less arbitrarily and then compared. Even by this crude method, many striking exceptions are noted, but a persuasive ingeniousness overcomes these obstacles, except for those skeptical persons who are satisfied to let the facts speak for themselves. Another fact which has not been explained satisfactorily is the wide and constant gap between the urban and rural tuberculosis mortalities. Careful investigations contradict the pretended relative sobriety of the rural population. On going back to the source of the earliest statistical comparisons mentioned between alcoholic consumption and tuberculosis mortality, we find figures published by De Lavarenne in 1900, presented to the International Congress at London by Brouardel, and gathered originally by Baudran, pharmacist at Beauvais, of whose records there is no trace. Baudran declared formally that he wanted to fortify his belief and conviction by statistical evidence of the relationship between alcoholic consumption and phthisis mortality, but that this idea was not as completely confirmed as he suspected it would be. De Lavarenne, in presenting his tables, made note of exceptions to the rule, for which he proposed several improbable explanations; also, his rates of alcoholic consumption were calculated for the whole population of each department, those of tuberculosis mortality only for the urban population; he naively states that there is much less drinking in the country than in the cities, a statement not borne out by more recently obtained facts. Bertillon's statistics are probably most familiar, because of their author's fame. They are derived from the official statistics for the single year 1906. For tuberculosis mortality only the population of localities of over 5,000 people is included, this being the first year that exact figures were obtainable for France. He, again, has used the method of grouping. Even so there are numerous discrepancies. The number of tuberculosis deaths in a population is not

found to increase proportionately to that of the alcoholics. Again, the nine departments in which the per capita consumption of alcohol is highest are far from forming the greater part of the group with highest tuberculosis mortality. Thus, the Seine-Inférieure, where the alcohol consumption reaches a maximum of 12.5 litres, is only thirty-fifth in tuberculosis mortality, just slightly above the average. The Seine, which has the highest tuberculosis mortality, is only fifteenth in alcohol consumption, with 3.5 litres. The Haute-Savoie, ninth in tuberculosis mortality, has the very low alcohol consumption of 1.2 litre (78th). Arnould has taken for his own studies the statistics of reported tuberculosis mortality between 1906 and 1913, furnished by the Minister of the Interior, and classified the departments on the basis of the entire eight years. The figures as to alcohol consumption have been calculated from the annual statistics published in a bulletin by the Minister of France. Fifty departments have been studied and also the urban and rural portions separated and compared. The following results were obtained: 1. In 48 of the 50 departments the tuberculosis mortality was markedly in excess in the urban population (the Seine and Upper Rhine were the exceptions). 2. In 22 of the 50 departments the rural alcoholic consumption rate equalled or surpassed that of the towns, the maximum excess being 30 per cent; the maximum deficit 25 per cent. 3. In the 22 departments where the rural alcoholic consumption surpassed the urban, the average tuberculosis mortality was 40 per cent below it; in the other 28 departments 44 per cent. No comment is needed. It is also evident that in neither rural nor urban populations is there any correlation between alcohol consumption and tuberculosis death-rate. The addition of the liquor made in crude stills in some of the departments would not essentially change this relation. Several additional facts are noted: 1. In towns over 5,000, alcohol consumption is diminishing and tuberculosis mortality increasing. 2. In both town and country, from 1907 to 1913, alcohol consumption increased, while tuberculosis mortality was lowered. We must then consider as very erroneous the so widespread opinion as to the close relationship between alcoholism and tuberculosis. The reality is readily apparent to those who do not suppress facts contradictory to preconceived ideas.—*Alcoholisme et tuberculose, E. Arnould, Rev. d.l. Tuberc., September, 1923, v, 496.*—(*A. P.*)

Influence of Low-Vitamine Diet on Skin Hypersensitiveness.—Insufficient diet exerts a baneful influence on the course of tuberculosis. In an experiment to test the effect of the scorbutic state upon tuberculin hypersensitiveness, guinea pigs were fed foods deficient in certain vitamines, then infected with tuberculosis along with normally fed animals, and the two groups skin-tested with tuberculin. The scorbutic tuberculous animals gave a less well-marked skin reaction and less of a febrile reaction (in these the temperature dropped) than the nonscorbutic tuberculous animals.—*Ueber die Beeinflussung der Tuberkulinreaktion durch die vitaminarme Ernährung, C. Prausnitz and F. Schilf, Deutsche med. Wchnschr., January 25, 1924, l, 102.*—(*H. S. W.*)

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